

**Copenhagen Offshore Wind 2005. 26-28 October 2005**

**Session Title: Offshore and Wind Synergies.  
26 October. 1330-1500hrs**

**Presentation Title:  
Differences and Synergies – an Offshore Contractors View.**

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## Introduction & Summary

It is relatively easy to describe the differences and similarities between the offshore oil & gas industry and the offshore wind industry. Synergies, on the other hand, are more difficult because, to use the dictionary definition, a synergy is 'the potential ability of things to be more successful when working together than on their own.'

KBR is an international project-based engineering and programme management company with many years experience of designing and building offshore oil & gas facilities and more recently, offshore wind projects. Part of the rationale behind our interest in this market has been our belief that there are enough synergies between the two industries to enable us to play a major role and make a significant contribution to the offshore wind industry

This paper describes our view of the existing and potential differences and synergies between the two industries. It is sub-divided into the five headings of technical, integration, construction and commissioning, operations and maintenance, and commercial.

In summary, the differences between the two industries are unsurprising and spring mainly from the different ages and physical characteristics of the two industries.

The similarities are mainly the people, processes and tools to design, build and operate projects in an offshore environment.

The identified synergies include:

1. End-to-end engineering, which in oil & gas is exhaustive.
2. Effective integration of multiple systems, which in oil & gas is essential and streamlined.
3. Safety and environmental protection, which has been quickly adopted by wind.
4. Reliability centred maintenance, which in oil & gas helps to ensure the least whole life cost of a field.
5. Appropriate contracts, which have developed over time in oil & gas.
6. Alliance and target cost commercial forms, which the wind industry should consider.
7. Early and integrated front end engineering.

## Technical

A multi-turbine wind farm needs an end-to-end approach to its design. Oil & gas projects always take this approach, and balance the long term needs (reliability and O&M costs) with the short term requirements to get the facilities in place. They also take a multi-disciplined, integrated approach, which is facilitated by most of the design being executed in one place. Another feature of this industry is that the inputs and outputs of the process are directly controlled and used by the client.

Wind farms, on the other hand, have a more challenging task because the system comprises three major components – turbine, foundations and electrical system, with no single established technical lead and a number of organisations controlling the output. There are therefore a number of interfaces where technical iteration requires collaboration between different sectors and companies. Examples of this include the electrical system, the tower and foundation system and the access system.

At present in the UK, we see only the beginnings of synergy between oil & gas and offshore wind, regarding end-to-end engineering. Examples of a systems approach include the collaborative work between turbine/tower designers and foundation designers and the work of the British Wind Energy Association (BWEA) to stimulate development and decision making for Round 2 grid connections.

On the other hand, standards and technologies have benefited from synergies. There is quite a long list which has transferred effectively from oil & gas to wind. They include structural and geotechnical design tools, power systems modelling and corrosion protection specifications.

The key question regarding standards and technologies is the speed and efficiency with which they are adapted to suit the different business, safety and environmental constraints of offshore wind.

It has been said that offshore wind cannot afford the ‘gold plating’ often found in the offshore oil & gas industry. This is an unhelpful statement. Firstly, any perception of ‘gold plating’ in the oil & gas industry probably arises from the times in its evolution when high capex/low opex solutions were adopted. Nowadays, whole-life optimisation processes, such as a reliability centred maintenance approach, described later in this paper, have resulted in sophisticated but fit-for-purpose solutions.

Secondly, the standards for offshore wind (e.g. factors of safety for environmental loading) have undergone a fairly rapid development to suit offshore wind. It might actually be the case that any perception of gold plating

arises from the relative uncertainty of wind loading and O&M requirements such as twin boat landings and equipment access/egress.

Perhaps the biggest synergy between oil & gas and offshore wind is the people. For very good very reasons we find that over half of the staff working in the offshore wind industry have an offshore oil & gas background.

### Integration

Offshore oil & gas projects are complex and use thorough integration processes. These include work breakdown structures, interface specifications and extensive integration management systems. Offshore wind farms are less complex. However, with high installation vessel day rates, they are very cost sensitive to interface errors and therefore good integration management is essential.

For various reasons the offshore wind industry draws from the project integration skills and experience of offshore oil & gas projects only to a limited extent. Herein lays an opportunity. Examples include integrated information management systems, to ensure full and early sight of data, integrated work breakdown structures, to minimise gaps and overlaps, and configuration management, to control change.

Compliance with consents is another component of integration. Compliance parameters are incorporated in the project management system in oil & gas projects, and managed by the Quality Assurance team, who ensure that compliance is met and demonstrated in all sub-systems, within the necessary time limits. This approach is worthy of consideration by offshore wind projects, where compliance with consents is presently managed by a variety of methods.

### Construction and Commissioning

Offshore oil & gas projects have always concentrated on maximising onshore fabrication and using a small number of large load-outs. The good sense of this approach has been quickly adopted by the offshore wind industry. For example, the offshore sub-station 'topsides' at Barrow were fully fabricated and assembled onshore. Further steps in this direction are slow, due to the lack of volume in the market. Examples include multi-functional vessels which can install a number of components and vessels that can install and the turbine and tower in one co-ordinated operation.

Installation methods and vessels are quite different between the two industries. Large deepwater methods characterise the oil & gas industry – few of which are applicable to the shallow waters of offshore wind. Consequently, synergies between them are presently only in transport and rock dump barges and cable

laying vessels, and the main tasks of pile installation and turbine erection are conducted by specially built or adapted vessels.

Construction management enjoys synergy between the two industries, particularly in safety and environmental management. Examples include the use of thorough environmental management plans to ensure the construction process minimises environmental impact and works within constraints, and the launch this year of British Wind Energy Association's Safety Guidelines for the Offshore Sector. These developments are due in part to experience, people and processes developed in the oil & gas industry.

There are a few commissioning similarities between the two industries at present. Both industries have high and low voltage electrical systems that require similar people, processes and tools. However, the turbine commissioning system has been developed over many years in the onshore wind industry and it is not known whether there are existing or potential synergies with oil & gas commissioning.

### Operations and Maintenance

There are presently only a few similarities between operations in the two industries. Both industries have high and low voltage electrical systems (an oil & gas platform can have up to 100MW installed capacity generated in situ and/or cabled from shore). The turbine monitoring and control (SCADA) systems are different from oil & gas, reflecting many years of separate development. However, foundations and cable/scour monitoring and inspection routines are similar. Routine access to oil & gas is by helicopter, whilst the offshore wind industry generally uses boat access, the design of which continues to develop. Synergistic opportunities may of course open up as the offshore wind industry grows.

Maintenance of offshore oil & gas facilities is sufficiently costly in terms of works and lost revenue that it has stimulated a reliability centred maintenance approach. This approach analyses the complete operations and maintenance system including failure rate analysis, re-active and pro-active maintenance costs, spares holdings etc. The results are a more optimised design and maintenance with lower whole life cost. This approach would be of benefit to the offshore wind industry, particularly as it grows in size.

Decommissioning is another area where offshore wind farms can draw from the experience of oil & gas. Offshore wind farm decommissioning, and also re-engineering, have only been briefly addressed and there are therefore development opportunities in this area.

## Commercial

### 1. Commercial similarities between oil & gas and wind

It is commonly said that the oil & gas industry and the wind industry are very different businesses which enjoy few commercial similarities. We would argue the opposite. KBR has worked with Clients in the offshore environment for many years and whilst we understand the differences in the business cases we are also very aware of and very experienced in managing the major similarities between the two industries: cost reduction, risk and supply chain management.

#### Cost Reduction and Risk – Oil & Gas Experience

In both industries the offshore project needs to provide an acceptable financial rate of return over a period of a number of years, when the income stream is not easy to predict. When the field is marginally economic, as is the case at present in offshore wind farms in UK, the focus falls upon a range of options, which include lowering the capital and operating costs.

The oil & gas fields in the North Sea were originally developed on a reimbursable or lump sum EPC basis up until the mid 1990s when, because of smaller fields, stagnant oil prices and rising costs, they became economically marginal. This resulted in the CRINE initiative (Cost Reduction Initiative for the New Era )and Alliancing, both of which contributed to reduced capital costs and both of which are worthy of serious consideration by the offshore wind industry.

The CRINE process was sponsored by the UK Government in the mid 1990s and was led by a committee of senior executives from all sectors of the UK offshore industry. One of the outputs of this process was the CRINE standard form of contract. The objective was to remove the additional time and cost associated with tendering and contracting against different types of contract for each project. Although there has inevitably been subsequent modification of the standard model to suit Client needs, the standardised form did contribute to lower costs.

Alliancing, or target cost based contracting, was another development, which was adopted by a number of major oil & gas clients in the mid 1990s. It was very successful in projects where the client and supply chain built up trust and an agreed method of establishing a target cost and the 'gainshare' and 'painshare' mechanism that surrounded it. Trust was crucial to create the joint incentivisation process and to remove profit on profit and duplicated risk (contingency) monies. KBR was the main Alliance partner with BP on the Andrew project (1995-98) in the Central North Sea. This was the first major offshore Alliance and resulted in capital costs savings of 23%.

Some of the clients that adopted Alliances continued to use this approach for a while, but then felt that they were losing control of the process, which itself had

lost its cost reducing challenge process, and prices were rising or capex was being reduced at the expense of opex. Consequently, some of them reintroduced the engineer procure construct (EPC) model. An example of an EPC project in which KBR was the prime contractor in the late 1990s is the South Arne project, in the Danish sector of the North Sea. The EPC approach ran for a number of years and the offshore contractors made profits on some projects but also suffered significant losses on others, resulting in many of them exiting the EPC market. We now have the situation where some Clients retain the EPC model and some contractors respond to it, and other Clients use multi-contracts and an experienced engineer/project manager to design and integrate the project, with financial incentives tied to outturn cost.

Both industries are in the similar position of managing offshore risk. The offshore oil & gas industry has done this for many years. Therefore lessons have been learnt and the industry is very familiar with risk identification (i.e. data and analysis), mitigation (generally engineering and management) and ownership (party best able to manage it) and, more importantly, by providing the commercial incentive to minimise risk (e.g. Alliancing) and the contractual clarity which will reduce multiple contingency pricing.

### Cost Reduction - Supply chain management

There are three commercial areas which similarly influence the supply chain in both industries.

First, all members of the supply chain seek an acceptable return on their investment in sales. Therefore projects which are well prepared and move through the tender process swiftly without excessive design work by many tenderers will result in lower prices.

Secondly, if the risks are well identified and measured the supply chain will be able to offer a price which is close to the real cost.

Thirdly, if the contract terms and conditions (e.g. payment; PCGs, bonds, insurances) are close to what the tenderers are used to, the process will be smoother and the price is likely to be lower.

## 2. Commercial difference between oil & gas and wind

Other than the different natures of the two businesses described above, there is one fundamental commercial difference between the two industries. This stems from the predominance of the turbine.

The oil & gas industry contains a number of prime contractors, none of whom are the major equipment suppliers. The suppliers focus on manufacture rather than offshore project management. The reverse is often true in the offshore wind industry. The turbine represents one half of the capital expenditure and this has contributed to the turbine manufacturer's move into a prime contract or consortium/joint venture role in some projects. This may have contributed to the lack of prime contractors or balance of plant contractors entering the market, and also to some Clients not developing the people and processes for multi-package management.

In addition, the oil & gas industry clients operate and maintain the facilities, whereas the wind industry clients in the UK let this to the wind farm contractor, led wholly or partly by the turbine manufacturer. It is quite conceivable that this will change once volume increases and/or a facilities management approach to offshore O&M starts to be taken.

### 3. So Where Are The Commercial Synergies?

#### Contracts

For similar reasons to those that influenced oil & gas, offshore wind appears to be moving more towards a multi-contract model. If this is the case, the oil & gas model of using a project engineer and integrator closely aligned to, or part of the Client's organisation, is a potential synergy between the two industries. The integrator effectively replaces the role otherwise provided by the prime contractor and therefore needs to provide integrated systems, end-to-end capabilities at all levels, and co-located working. KBR very familiar with this method, having worked in this role for a number of oil & gas clients.

#### Alliances and Target Costs

We recommend that serious consideration be given to an Alliance or target cost based approach to offshore wind farms, in order to create better incentives for all of the package providers to manage the project risk at least cost to the Client.

In the same way that this 'open book' approach addressed the need for cost reduction in oil & gas projects, we believe it may be the only way to drive out multiple contingent pricing and profit on profit.

The oil and gas Alliance model is based on an accumulation of a lot of past project experience. It is not a 'one size fits all' model and will only succeed if it has strong leadership and commitment to eliminate duplication of effort.

## Front End Processes

Whichever contractual model is adopted, the following processes, some of which have been used by the oil & gas industry, are worthy of serious consideration by the offshore wind industry:

- Front end engineering design at the same time as consent application.
- (Competitive) selection of the turbine first.
- Front end engineering design of the electrical system and foundations next.
- Selection of the installation contractor based upon methodology and day rates.
- Benchmarking of standards and costs.
- Integrated working between Client and supply chain, with standardised information systems and minimal 'double-checking'.

## Example of a Synergy



Barrow Offshore Wind Farm sub-station.  
Client: DONG and Centrica.  
Prime Contractor: Vestas/KBR  
Principal Sub-Contractor: Areva